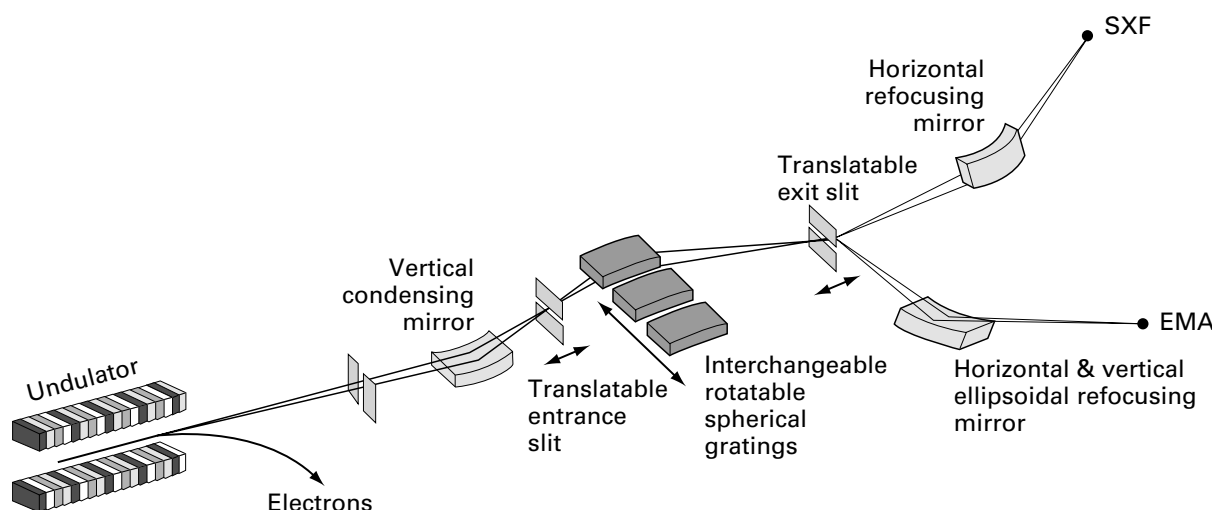


High Resolution and Flux for Materials and Surface Science • Beamline 8.0.1

Berkeley Lab • University of California

Beamline Specifications

Photon Energy Range (eV)	Photon Flux (photons/s)	Spectral Resolution (E/ΔE)	Spot Size (μm)	Availability
65–1400 (at 1.5 GeV)	$\sim 10^{11}$–6×10^{15} (dependent upon resolution & energy)	<8000 (typical)	100	NOW
~80–1400 (at 1.9 GeV)				



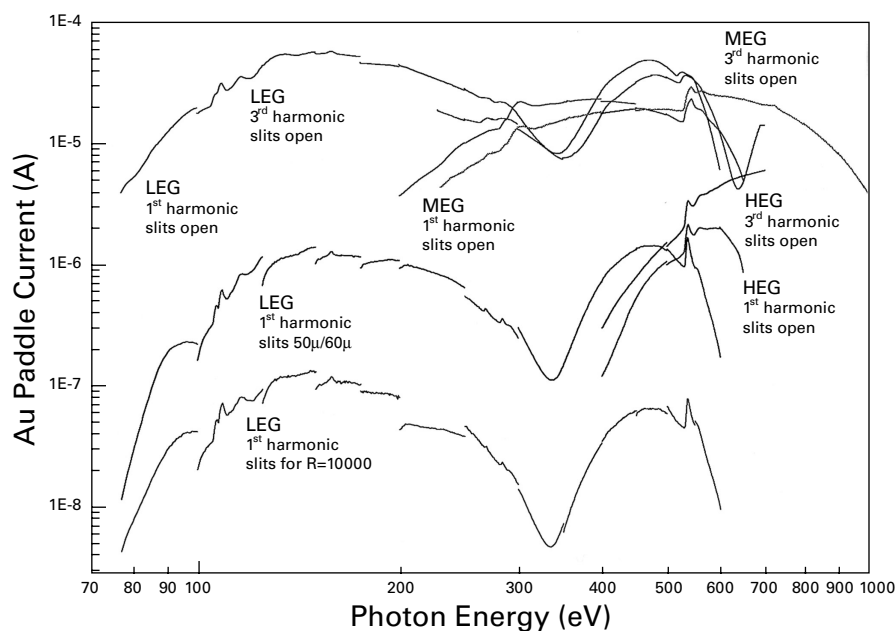
Schematic layout of Beamline 8.0.1.

Beamline 8.0.1 serves two permanently placed, PRT-owned experimental stations (each described in a separate data sheet) for high-resolution spectroscopy and imaging of materials and surfaces.

An ellipsoidal mirror electron energy analyzer (EMA) for x-ray photoelectron spectroscopy (XPS), angle-resolved photoelectron spectroscopy (ARPES), and near-edge x-ray absorption fine-structure spectroscopy (NEXAFS) and a soft x-ray fluorescence (SXF) spectrometer are mounted on a movable platform that rides on air bearings. A rotating platform allows the stations to share beamtime so that one of them is in line to receive

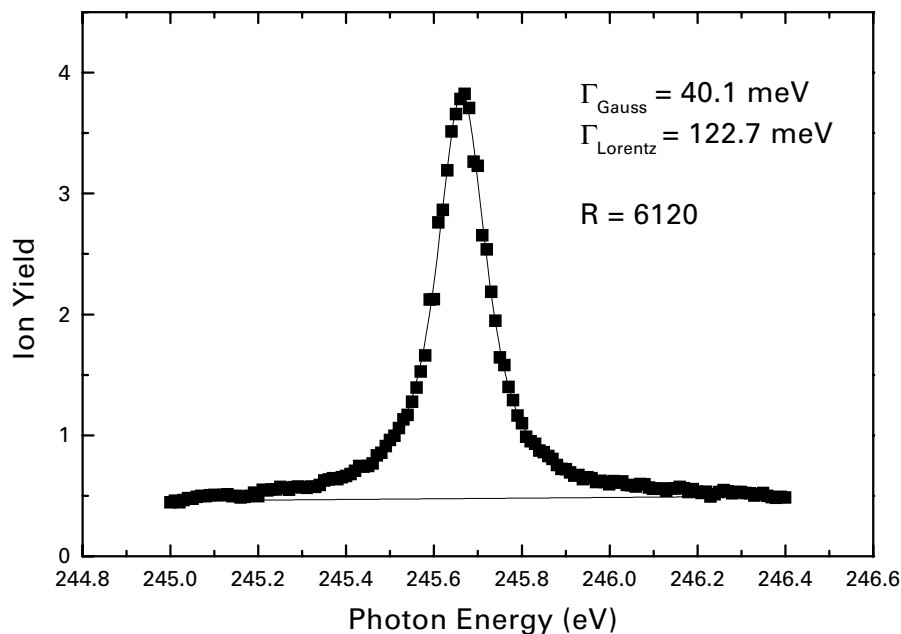
synchrotron light. A flexible bellows joins the two stations to the beamline.

The beamline operates over the energy range from 65 to 1400 eV (at 1.5-GeV electron-beam energy) using a 5-cm-period undulator and a spherical-grating monochromator (SGM) with three interchangeable gratings. The resolution of the monochromator is selectable by means of variable entrance- and exit-slit widths. Spectral resolutions above 6,000 have been achieved. The flux at a calculated resolution of 10,000 varies above and below 1012 photons/s. Focusing is optimized by moving both the entrance and exit slits to satisfy the Rowland geometry. ■



High flux over the full spectral range.

The monochromator operates in both the first and second orders with three gratings (LEG, MEG, and HEG) with line densities of 150, 380, and 925 lines/mm. The flux was measured for an entrance-slit width of 50 μm , an exit-slit width of 60 μm , and an optimized exit-slit position. The curves give the results of measurements made at various harmonics of the U5 undulator with the ALS operating at 1.9 GeV, normalized to a 400-mA beam current. The flux with slits narrowed to give a calculated resolution of 10,000 is about 10^{12} photons/s.



Monochromator resolution. Gas-phase ion-yield photoabsorption spectrum at the argon $2p \rightarrow 4s$ resonance showing a monochromator resolution of 40.1 meV corresponding to a resolving power ($E/\Delta E$) in excess of 6000. Data courtesy of D. Lindle, O. Hemmers, H. Wang, and D. Hansen (University of Nevada, Las Vegas); R. Püttner (Freie Universität Berlin); and C. Heske (ALS).

To obtain a proposal form, go to www-als.lbl.gov/als/quickguide/independinvest.html.

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